Toward a Federated Global-Scale File System

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FAST'07 WiP

What is a “Federated storage system”?

- A federation is not simply a really big cluster.
  - Federation members contribute/share resources.
  - Federation members retain local control:
    - How resources are allocated
    - Who is authorized to do what
    - Local replication / migration
- Goal: enhance the user experience.
  - Support for a global shared namespace.
  - Uniform abstraction.

Currently, clusters of different types typically do not interact meaningfully

Clusters of Server Brand A

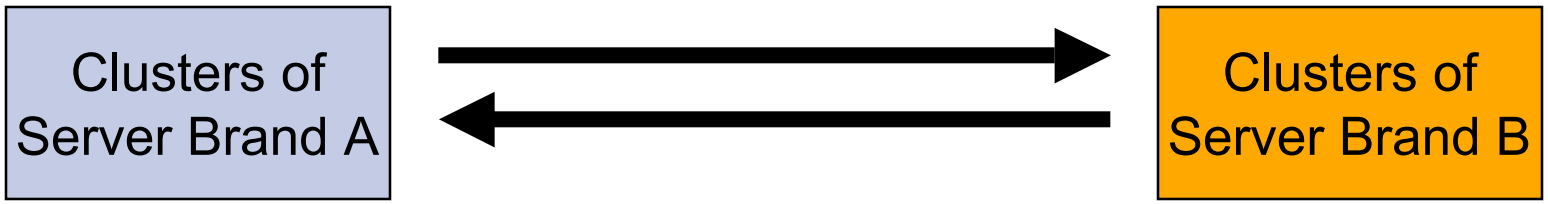
Clusters of Server Brand B

Islands of Data

Let Brand A affiliate with Brand B

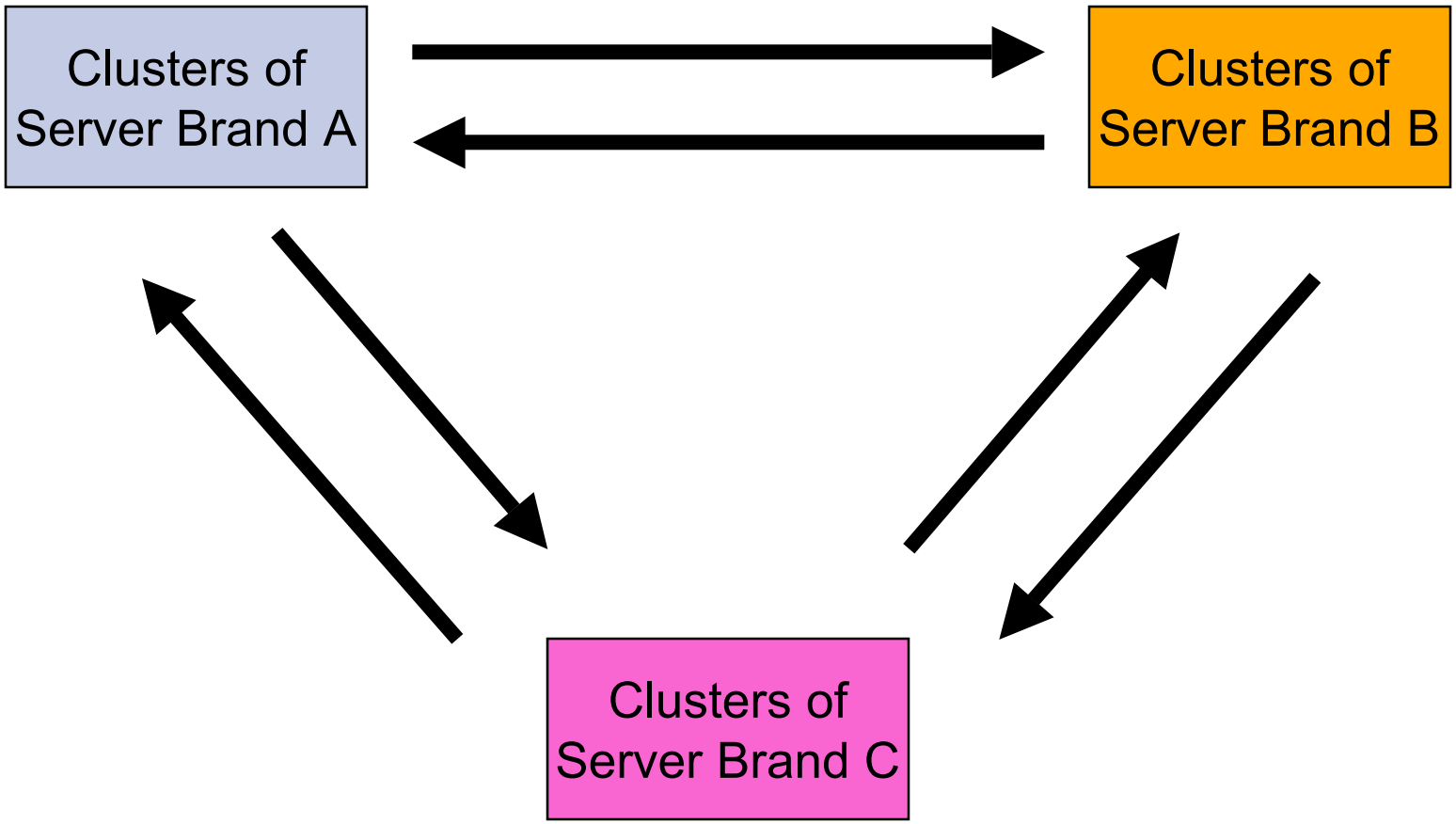
Cluster B can be a leaf in Cluster A's namespace

Perhaps Brand B returns the favor

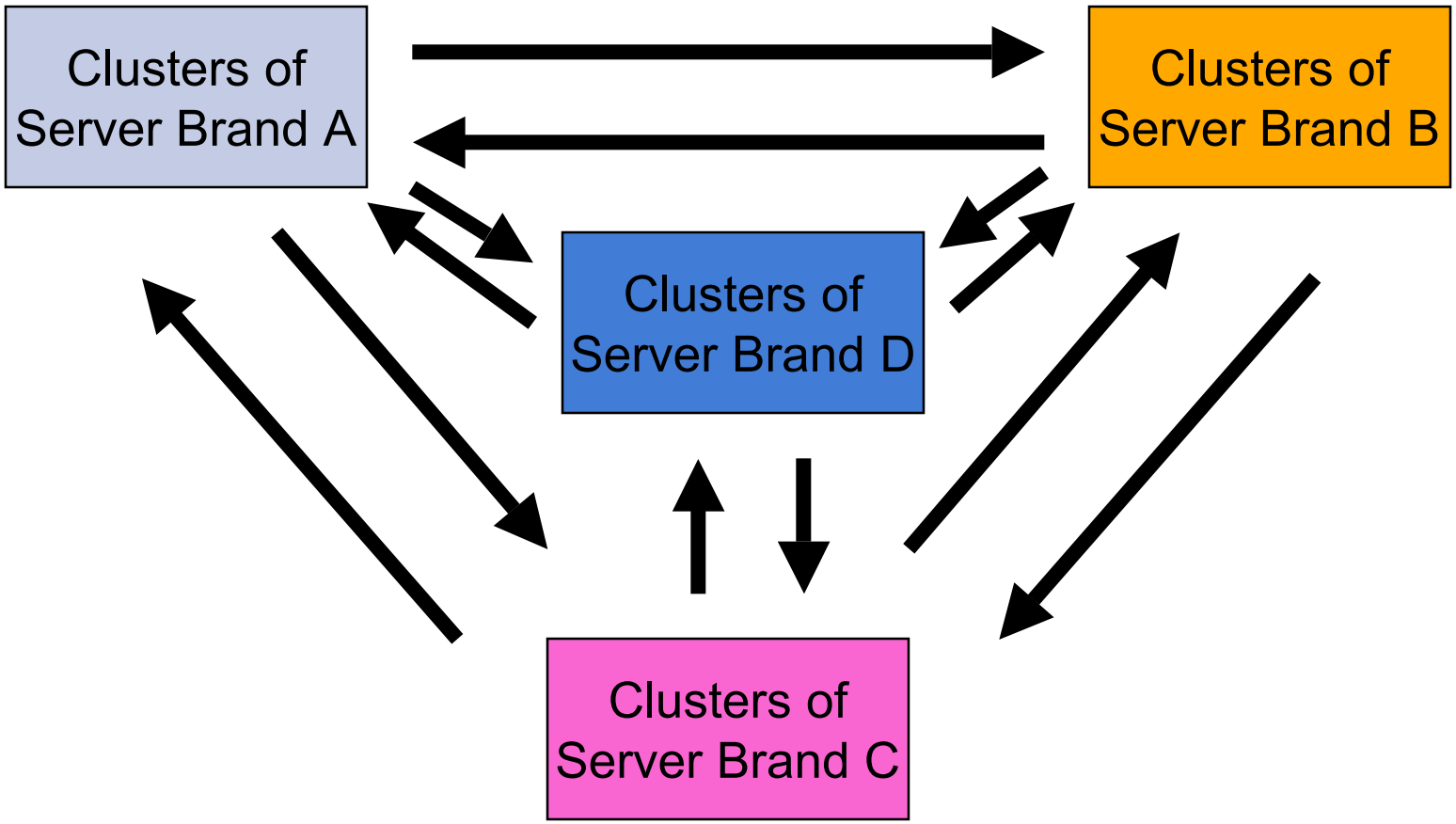


Clusters A and B are peers

But then Brand C comes along…



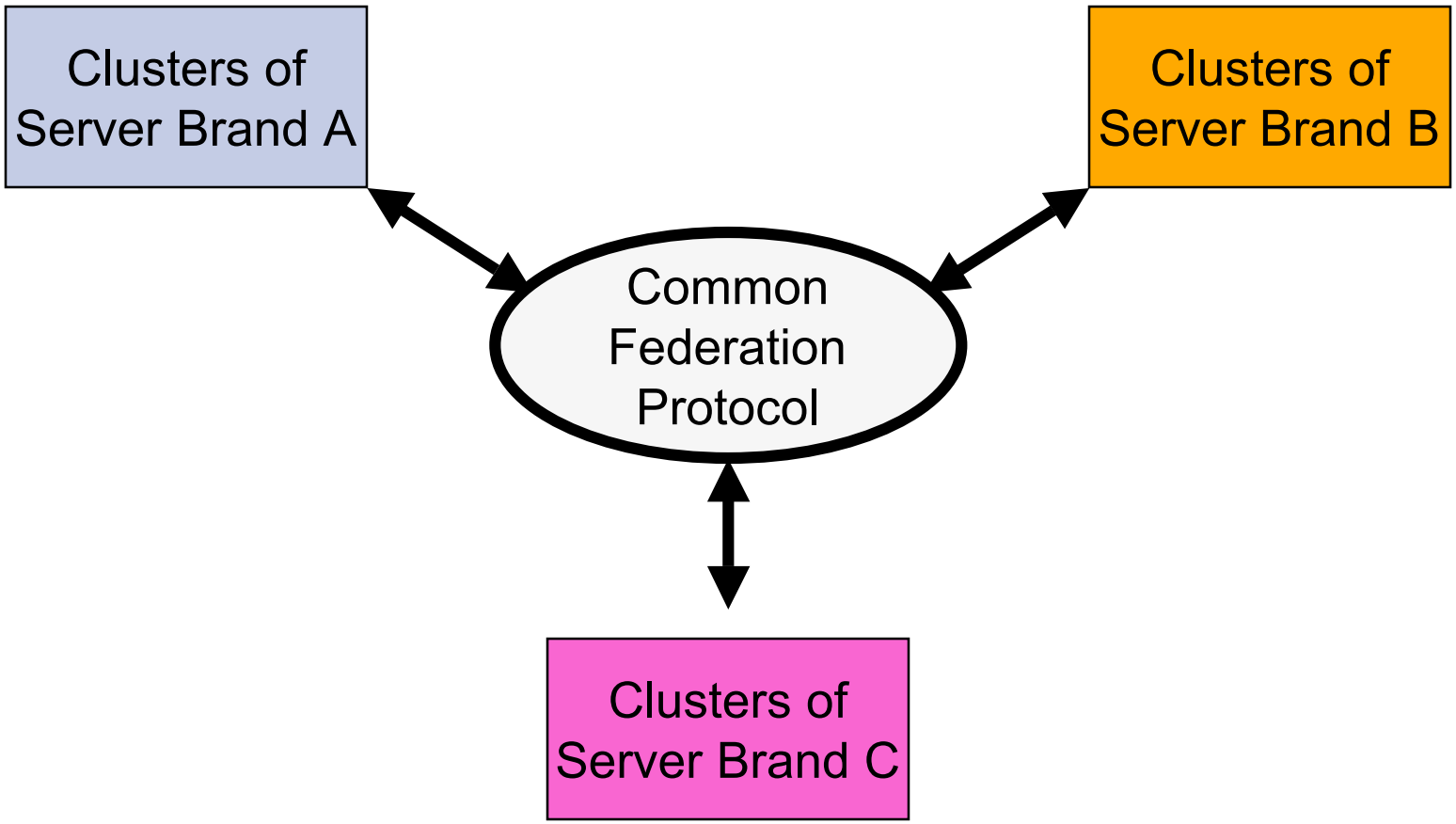
… and then Brand D …



This is no way to build a federation

- For N cluster types, each cluster has N-1 peer relationships to spec, build, test, document, support…
- We don't have time for this.
  - Not in this WiP
  - Not in our release cycles

A better way - an open, common protocol



Benefits of a common federation protocol

- **Extends the standard protocol suite.**
  - Customers buy from their preferred vendor and use their preferred software.
  - Customers are not locked in.
- **Reduces the implementation effort.**
  - Interfaces are standard and well-defined.
  - Existing federation members do not need to be changed or upgraded in order to support new federation members.
  - Nobody is locked out.

Important issues

- Client issues: which clients to support?
  - CIFS and NFSv4 simplify federation.
  - Many clients are still happily using NFSv3.
- Admin issues: features versus commonality.
  - Can one type of federation member, with permission from a second, administer the second?
  - Can we make things simpler via federation, or are we adding another tool that admins have to learn?
    - At the very least, creating a cross-cluster junction should be easy.

We're looking for collaborators

- **Current focus:**
  - **Mechanisms to build a platform-agnostic, global namespace.**

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